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April 14, 1853.

COLONEL SABINE, R.A., Treas. & V.P., in the Chair.

The Right Honourable Viscount Palmerston was admitted into the Society.

A paper was read, entitled "On certain Functions of the Spinal Chord." By J. Lockhart Clark, Esq. Communicated by E. Solly, Esq., F.R.S. Received March 15.

These investigations were undertaken by the author partly with the view of settling the long-agitated question whether all the roots of the spinal nerves terminate in the spinal chord, or whether any part of them ascend within the white or grey columns to the brain. The preparations employed for this purpose were made according to the new method described in the author's former communication, Phil. Trans. 1851, Part 2; and the animals selected were the Ox, Calf, Cat, Rat, Mouse and Frog. Of the spinal chord of the Cat, he has succeeded, after much trouble, in rendering transparent longitudinal sections $\frac{1}{12}$ th of an inch in thickness, and more than two inches in length, including the roots of four or five pairs of nerves.

The principal results at which the author has arrived are as follows :—

That the posterior roots of the spinal nerves consist of three kinds ; two of these enter the posterior grey substance at right angles, and the third kind with different degrees of obliquity upwards, a small proportion of the latter taking a longitudinal course and becoming lost in the posterior white columns.

That in no instance were any of the fibres of the anterior roots seen to ascend with the anterior white columns, before they entered the grey substance.

That, besides the transverse bundles that form the anterior roots, a continuous system of exceedingly fine transverse fibres issue from the anterior grey substance and become lost as they proceed towards the surface of the chord.

That from the preceding facts, it may be inferred that nearly all, if not the whole of the fibres composing the roots of the spinal nerves proceed at once to the grey substance of the chord ; and that if any of them ascend *directly* to the brain, it must be *those only* of the *posterior* roots which run longitudinally in the posterior white columns.

That the communication between the sensorium and the spinal nerves is not established by the posterior white columns, but by the antero-lateral columns, especially the lateral.

That many of the fibres which belong respectively to the anterior and posterior roots in different regions of the chord, terminate there by forming with each other a series of loops of various sizes and lengths ; and that it is not improbable that some of them may reach even as far as the brain, as it is well known that the formation of loops is one mode in which nerve-fibres do terminate there. A por-

tion of the roots however may be connected with the vesicles of the chord, although the evidence of any such connection is very unsatisfactory.

That there are reasons for believing that the grey substance of the chord does not transmit impressions to and from the brain; and that the fine longitudinal fibres described by Stilling have not been found by the author.

That there is a great correspondence in the fibrous arrangement between the grey substance of the chord and the chiasma of the optic nerves. That the fact that the nerve-roots not only diverge both upwards and downwards to a considerable distance beyond their point of entrance, but intermingle also with each other in the most intricate manner, may explain how impressions made at one particular spot are communicated in different directions to distant parts of the chord, so as to excite a simultaneous and sympathetic action in classes of muscles which otherwise would appear unconnected.

April 21, 1853.

The EARL OF ROSSE, President, in the Chair.

The following letters were read :—

1. Extract from a letter from M. Regnault to Col. Sabine, R.A., Treas. R.S.

MON CHER COL. SABINE,—Je reçois aujourd'hui les Transactions Philosophiques de 1852, et j'y vois, avec surprise et avec une grande satisfaction, que la Société Royale de Londres m'a fait l'honneur, au mois de Novembre dernier, de me nommer un de ses membres étrangers. Jusqu'ici je n'en avais reçu aucun avis; je viens donc vous prier de vouloir bien remercier, en mon nom, la Société Royale pour le témoignage d'estime qu'elle m'a donné, et de lui indiquer en même temps les circonstances qui m'ont empêché de lui adresser plutôt ces remerciements.

J'ai trouvé dans les Transactions de 1852 un mémoire de MM. Joule et Thomson sur la chaleur spécifique de l'air atmosphérique, et des expériences des mêmes auteurs sur les effets calorifiques qui se produisent pendant le passage de l'air à travers de petites ouvertures. Je me suis occupé depuis longtemps de ces divers sujets, et, depuis plusieurs années, tout ce qui se rapporte à ce point est terminé. Si je n'ai pas publié mes résultats jusqu'ici, c'est qu'ils forment une très petite partie de mes recherches qui m'occupent depuis six ans, et que mon intention est de publier dans leur ensemble. Elles formeront un volume des mémoires de notre Académie; leur publication est longue à cause des calculs numériques énormes qu'il a fallu exécuter. Cette publication s'est d'ailleurs trouvée fortement entravée par mes nouvelles fonctions de Directeur de la manufacture de Sèvres que j'ai acceptée bien malgré moi, prévoyant bien les obstacles qu'elles présenteraient à l'exécution de mes travaux scientifiques. Mais, enfin,